

Summary of the Office Action

Claims 1-17 stand rejected under 35 U.S.C. §102(b) as allegedly anticipated by U.S. Patent 5,561,030 (hereinafter "Holdcroft et al.") and as allegedly anticipated by U.S. Patent 5,721,091 (hereinafter "Watanabe et al.").

The Amendments to the Claims

New claims 18 and 19 have been added. Support for new claims 18 and 19 can be found in the instant specification at, for example, page 3, line 39, through page 4, line 17, page 8, line 40, through page 9, line 3, page 9, lines 14-18, and at page 12, line 22, through page 22, line 12. No new matter has been added by way of the amendments to the claims. Separate documents setting forth the precise changes to the claims and the text of the pending claims as amended are attached hereto.

Discussion of the Anticipation Rejections

The Office Action rejects claims 1-17 under 35 U.S.C. § 102(b) as allegedly anticipated by Holdcroft et al. and Watanabe et al. In particular, the Office contends that Holdcroft et al. anticipates the claimed invention at column 3, line 61-column 4, line 14, and column 4, lines 55-59. Moreover, the Office contends that Watanabe et al. anticipates the claimed invention at claims 1 and 8 and column 6, lines 53-60. Applicants respectfully traverse the Section 102(b) rejections for the reasons set forth below.

Claim 1 and claims 2-12 (which depend from claim 1) are directed to a material for making an electroconductive pattern. The material comprises a support and a light-exposure differentiable element, "characterized in that said light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene" (see claim 1). Claim 13 and claims 14-15 (which depend from claim 13) are directed to a method of making an electroconductive pattern on a support that comprises, *inter alia*, "providing a material for making an electroconductive pattern, said material comprising a support and a light-exposure differentiable element, wherein said light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene" (see claim

13). Claim 16 and claim 17 (which depends from claim 16) are directed to a method of making an electroconductive pattern on a support without a removal step that comprises, *inter alia*, "providing a material for making an electroconductive pattern, said material comprising a support and a light-exposure differentiable element, characterized in that said light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene having a surface resistivity lower than $10^6 \Omega/\text{square}$ " (see claim 16).

While Holdcroft et al. at column 3, line 61-column 4, line 14, discloses "a method of forming electronically conducting patterns of an oxidizable π -conjugated polymer or π -conjugated oligomer which are electrically conducting in their oxidized form," and while Holdcroft et al. at column 4, lines 54-59 discloses that "the π -conjugated polymer or π -conjugated oligomer can be based on a substance selected from the group consisting of 3-alkylthiophene, 3,4-alkylthiophene, 3-alkoxythiophene, 3,4-alkoxythiophene and 3-alkylsulphonate," there is no teaching or suggestion in Holdcroft et al. of a material comprising a support and a light-exposure differentiable element, wherein the light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene as recited in pending claim 1 (and as required by pending claims 2-12). Nor is there any teaching or suggestion of a method that comprises providing a material for making an electroconductive pattern, wherein the material comprises a support and a light-exposure differentiable element and wherein the light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene, as recited in pending claim 13 (and required by pending claims 14-15). Moreover, there is no teaching or suggestion of a method that comprises providing a material for making an electroconductive pattern, wherein the material comprises a support and a light-exposure differentiable element and wherein the light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene having a surface resistivity lower than $10^6 \Omega/\text{square}$ as recited in pending claim 16 (and as required by pending claim 17). Since Holdcroft et al. does not disclose all of the features of the pending claims, it cannot be said to anticipate those claims.

As regards Watanabe et al., claims 1 and 8 of that reference are each directed to a process for forming a pattern that involves providing a composition comprising a sulfonated polyaniline. In this regard, Watanabe et al., at column 6, lines 53-60, describes a preferred sulfonated polyaniline. There is no teaching or suggestion, however, of a material comprising a support and a light-exposure differentiable element, "characterized in that said light exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene" as recited in pending claim 1 (and as required by pending claims 2-12). Nor is there any teaching or suggestion of a method that comprises providing a material for making an electroconductive pattern, wherein the material comprises a support and a light-exposure differentiable element and wherein the light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene, as recited in claim 13 (and as required by claims 14-15). Moreover, there is no teaching or suggestion of a method that comprises providing a material for making an electroconductive pattern, wherein the material comprises a support and a light-exposure differentiable element and wherein the light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene having a surface resistivity lower than $10^6 \Omega/\text{square}$, as recited in claim 16 (and required by claim 17).

Since Watanabe et al. fails to disclose each and every feature of the present invention as defined by the pending claims, it cannot be said that it anticipates those claims. Accordingly, the anticipation rejection under Section 102(b) is improper and should be withdrawn.

Discussion of the New Claims

Claim 18 is directed to a material for making an electroconductive pattern that comprises a support and a light-exposure differentiable element, "characterized in that said light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene" (see claim 18). Claim 19 is directed to a method of making an electroconductive pattern on a support that comprises, *inter alia*, "providing a material for making an electroconductive pattern, said material comprising a support and a light-exposure differentiable element, wherein said light-

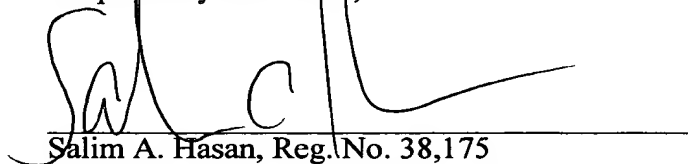
In re Appln. of Lamotte et al.
Application No. 09/891,649

exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene" (see claim 19). Neither Holdcroft et al. nor Watanabe et al. teach or suggest a material that comprises a support and a light-exposure differentiable element, wherein the light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene. Accordingly, new claims 18 and 19 are novel and inventive over those references.

Conclusion

The application is considered in good and proper form for allowance, and the Examiner is respectfully requested to pass this application to issue. If, in the opinion of the Examiner, a telephone conference would expedite the prosecution of the subject application, the Examiner is invited to call the undersigned attorney.

Respectfully submitted,



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Date: March 18, 2003

In re Appln. of Lamotte et al.
Application No. 09/891,649

CERTIFICATE OF MAILING

I hereby certify that this AMENDMENT (along with any documents referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231.

Date:

3/18/03

Virginia Scheffe ✓



PATENT
Attorney Docket No. 212278
Client Reference No. GN 00008

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Lamotte et al.

Application No. 09/891,649

Filed: June 26, 2001

For: MATERIAL AND METHOD FOR MAKING
AN ELECTROCONDUCTIVE PATTERN

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APR 18 2003

GROUP 1700

Art Unit: 1752

Examiner: John S Y Chu

AMENDMENTS TO CLAIMS ON MARCH 18, 2003

18. (New) A material for making an electroconductive pattern, said material comprising a support and a light-exposure differentiable element, characterized in that said light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene, and optionally a second layer contiguous with said outermost layer; and wherein said outermost layer and/or said optional second layer contains a light-sensitive component capable upon exposure of changing the removability of the exposed parts of said outermost layer relative to the unexposed parts of said outermost layer, said light-sensitive compound selected from the group consisting of a multidiazonium salt, a resin comprising a diazonium salt and a quinonediazide compound.

19. (New) Method of making an electroconductive pattern on a support comprising the steps of:

- providing a material for making an electroconductive pattern, said material comprising a support and a light-exposure differentiable element, wherein said light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene, and optionally a second layer contiguous with said outermost layer, and wherein said outermost layer and/or said optional second layer contains a light-sensitive component capable upon exposure of changing the removability of the exposed parts of said outermost layer relative to the unexposed parts of

said outermost layer, said light-sensitive compound selected from the group consisting of a multidiazonium salt, a resin comprising a diazonium salt and a quinonediazide compound;

- image-wise exposing said material thereby obtaining a differentiation of the removability, optionally with a developer, of said exposed and said non-exposed areas of said outermost layer;

- processing said material, optionally with said developer, thereby removing areas of said outermost layer; and

- optionally treating said material to increase the electroconductivity of said non-removed areas of said outermost layer.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:

Lamotte et al.

Application No. 09/891,649

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Art Unit: 1752

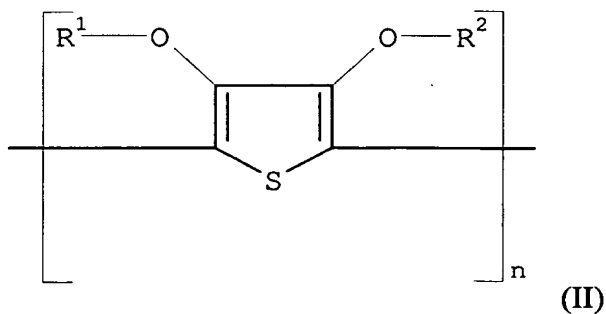
Examiner: John S Y Chu

For: MATERIAL AND METHOD FOR MAKING
AN ELECTROCONDUCTIVE PATTERN

PENDING CLAIMS AS OF MARCH 18, 2003

1. A material for making an electroconductive pattern, said material comprising a support and a light-exposure differentiable element, characterized in that said light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene, and optionally a second layer contiguous with said outermost layer; and wherein said outermost layer and/or said optional second layer contains a light-sensitive component capable upon exposure of changing the removability of the exposed parts of said outermost layer relative to the unexposed parts of said outermost layer.

2. Material according to claim 1, wherein said polymer of a substituted or unsubstituted thiophene corresponds to formula (II):



in which n is larger than 1 and each of R¹ and R² independently represent hydrogen or an optionally substituted C₁₋₄ alkyl group or together represent an optionally substituted C₁₋₄ alkylene group or an optionally substituted cycloalkylene group, preferably an ethylene group, an optionally alkyl-substituted methylene group, an optionally C₁₋₁₂ alkyl- or phenyl-substituted ethylene group, a 1,3-propylene group or a 1,2-cyclohexylene group.

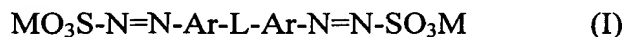
3. Material according to claim 1, wherein said polyanion is poly(styrene sulphonate).

4. Material according to claim 1, wherein said outermost layer has a surface resistivity lower than 10⁶ Ω/square.

5. Material according to claim 1, wherein said light-sensitive component capable upon exposure of changing the removability of the exposed parts of said outermost layer relative to the unexposed parts of said outermost layer is a multidiazonium salt or a resin comprising a diazonium salt which reduces the removability of exposed parts of said outermost layer.

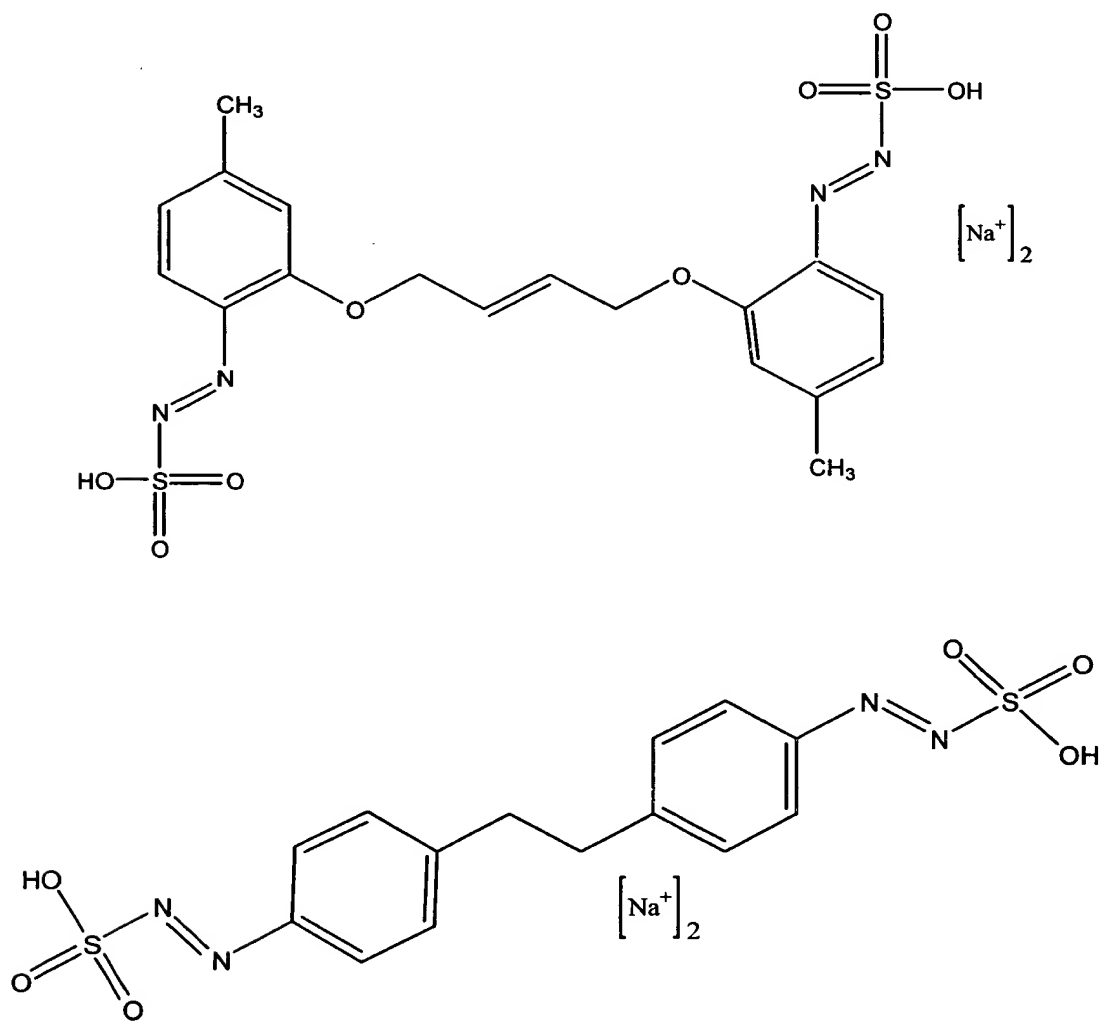
6. Material according to claim 1, wherein said light-sensitive component capable upon exposure of changing the removability of the exposed parts of said outermost layer relative to the unexposed parts of said outermost layer is a bis(aryldiazosulphonate) salt, a tris(aryldiazosulphonate) salt or a tetrakis(aryldiazosulphonate) salt which reduces the removability of exposed parts of said outermost layer.

7. Material according to claim 1, wherein said light-sensitive component capable upon exposure of changing the removability of the exposed parts of said outermost layer relative to the unexposed parts of said outermost layer is a bis(aryldiazosulphonate) salt, which reduces the removability of exposed parts of said outermost layer, according to formula (I):



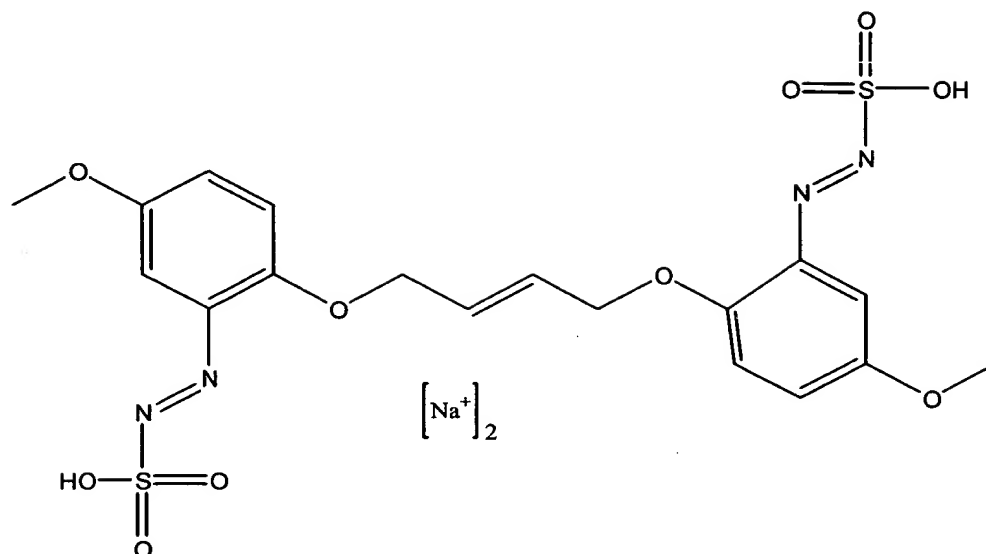
where Ar is a substituted or unsubstituted aryl group, L is a divalent linking group, and M is a cation.

8. Material according to claim 6, wherein said bis(aryldiazosulphonate) salt is selected from the group consisting of



and

A



9. Material according to claim 1, wherein said light-sensitive component capable upon exposure of changing the removability of the exposed parts of said outermost layer relative to the unexposed parts of said outermost layer is a polymer or copolymer of an aryldiazosulphonate which reduces the removability of exposed parts of said outermost layer.

10. Material according to claim 9, wherein in said light-exposure differentiable element the weight ratio of said polymer or copolymer of an aryldiazosulphonate to said polymer or copolymer of a substituted or unsubstituted thiophene is between 10:200 and 400:200.

11. Material according to claim 1, wherein said light-sensitive component capable upon exposure of changing the removability of the exposed parts of said outermost layer relative to the unexposed parts of said outermost layer is a quinonediazide compound which increases the removability of exposed parts of said outermost layer.

12. Material according to claim 1, wherein said support is treated with a corona discharge or a glow discharge.

13. Method of making an electroconductive pattern on a support comprising the steps of:

- providing a material for making an electroconductive pattern, said material comprising a support and a light-exposure differentiable element, wherein said light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene, and optionally a second layer contiguous with said outermost layer; and wherein said outermost layer and/or said optional second layer contains a light-sensitive component capable upon exposure of changing the removability of the exposed parts of said outermost layer relative to the unexposed parts of said outermost layer;

- image-wise exposing said material thereby obtaining a differentiation of the removability, optionally with a developer, of said exposed and said non-exposed areas of said outermost layer;

- processing said material, optionally with said developer, thereby removing areas of said outermost layer; and

- optionally treating said material to increase the electroconductivity of said non-removed areas of said outermost layer.

14. Method according to claim 13, wherein said non-removed areas of said outermost layer have a surface resistivity lower than $10^6 \Omega/\text{square}$.

15. Method according to claim 13, wherein said non-removed areas of said outermost layer have a surface resistivity lower than $10^4 \Omega/\text{square}$.

16. Method of making an electroconductive pattern on a support without a removal step comprising the steps of:

- providing a material for making an electroconductive pattern, said material comprising a support and a light-exposure differentiable element, characterized in that said light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene having a surface resistivity lower than $10^6 \Omega/\text{square}$, and optionally a second layer contiguous with said

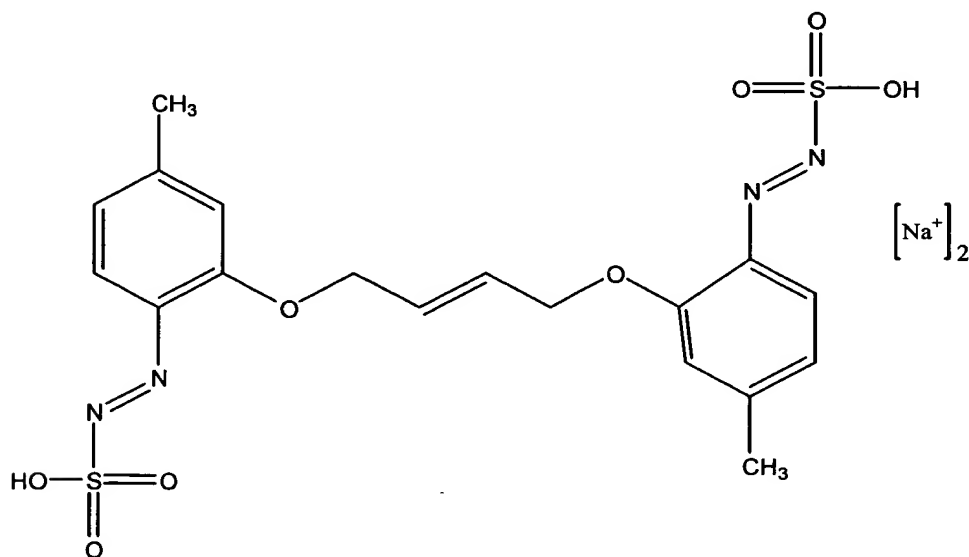
outermost layer; and wherein said outermost layer and/or said optional second layer contains an aryl diazosulfonate according to formula (I):

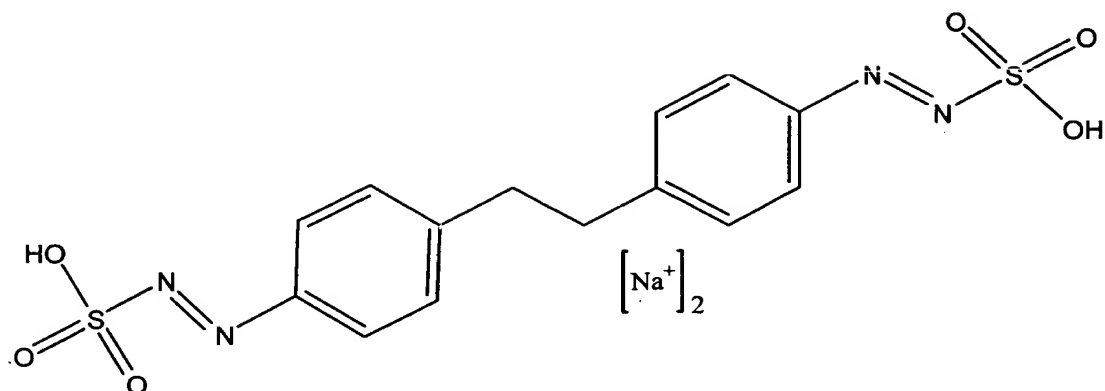


where Ar is a substituted or unsubstituted aryl group, L is a divalent linking group, and M is a cation; capable upon exposure of changing the removability of the exposed parts of said outermost layer relative to the unexposed parts of said outermost layer; and

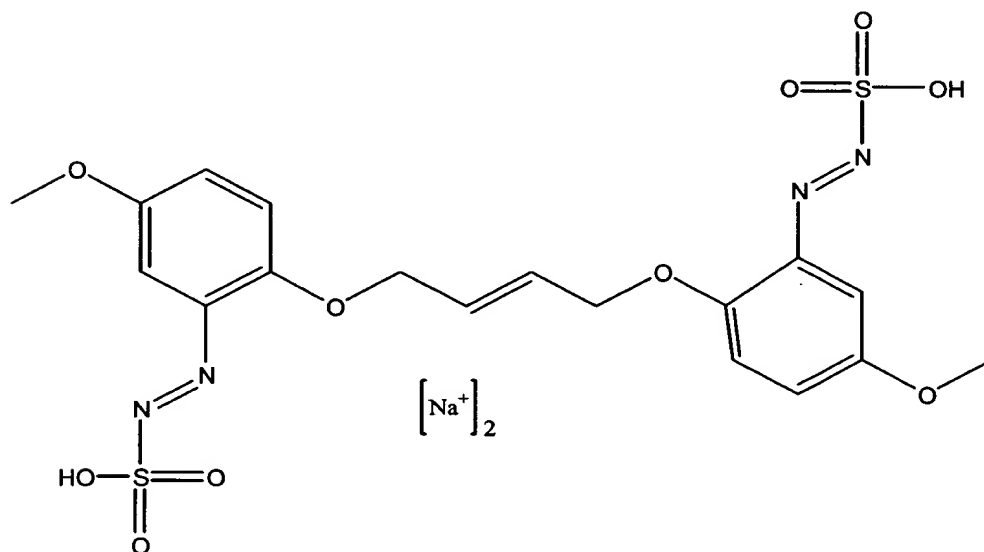
- image-wise exposing the material thereby obtaining reduction in the conductivity of the exposed areas relative to non-exposed areas, optionally with a developer.

17. Method of making an electroconductive pattern on a support without a removal step according to claim 16, wherein said bis(aryldiazosulphonate) compound according to formula (I) is selected from the group consisting of





and



18. A material for making an electroconductive pattern, said material comprising a support and a light-exposure differentiable element, characterized in that said light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene, and optionally a second layer contiguous with said outermost layer; and wherein said outermost layer and/or said optional second layer contains a light-sensitive component capable upon exposure of changing the removability of the exposed parts of said outermost layer relative to the unexposed parts of

said outermost layer, said light-sensitive compound selected from the group consisting of a multidiazonium salt, a resin comprising a diazonium salt and a quinonediazide compound.

19. Method of making an electroconductive pattern on a support comprising the steps of:

- providing a material for making an electroconductive pattern, said material comprising a support and a light-exposure differentiable element, wherein said light-exposure differentiable element comprises an outermost layer containing a polyanion and a polymer or copolymer of a substituted or unsubstituted thiophene, and optionally a second layer contiguous with said outermost layer; and wherein said outermost layer and/or said optional second layer contains a light-sensitive component capable upon exposure of changing the removability of the exposed parts of said outermost layer relative to the unexposed parts of said outermost layer, said light-sensitive compound selected from the group consisting of a multidiazonium salt, a resin comprising a diazonium salt and a quinonediazide compound;
- image-wise exposing said material thereby obtaining a differentiation of the removability, optionally with a developer, of said exposed and said non-exposed areas of said outermost layer;
- processing said material, optionally with said developer, thereby removing areas of said outermost layer; and
- optionally treating said material to increase the electroconductivity of said non-removed areas of said outermost layer.